424 Rec'd PCT/PTO 14 JUL 2000

FORM PTO-1390 REV. 5-93	US DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTORNEYS DOCKET NUMBER **P00,1334**
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371		U.S. APPLICATION NO. (if known, see 37 CFR 1.5) 09/600364
INTERNATIONAL APPLICATION NO. **PCT/DE98/03696**	INTERNATIONAL FILING DATE **16 DECEMBER 1998**	PRIORITY DATE CLAIMED **22 JANUARY 1998**

TITLE OF INVENTION **"METHOD OF TRANSMISSION AND TRANSMISSION SYSTEM"**

APPLICANT(S) FOR DO/EO/US

THOMAS ZELLERHOFF

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay.
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.

5. ☒ A copy of International Application as filed (35 U.S.C. 371(c)(2)) - drawings attached.
   a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ has been transmitted by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2) - drawings attached.

7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. §371(c)(3))
   a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ have been transmitted by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☒ have not been made and will not be made.

8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).

9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).

10. ☒ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern other document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98; **(PTO 1449, Prior Art, Search Report).**

12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 C.F.R. 3.28 and 3.31 is included. **(SEE ATTACHED ENVELOPE)**

13. ☒ Amendment "A" Prior to Action.
    ☐ A SECOND or SUBSEQUENT preliminary amendment.

14. ☐ A substitute specification.

15. ☐ A change of power of attorney and/or address letter.

16. ☒ Other items or information:
    a. ☒ Submission of Informal Drawings - 2 Sheets of Drawings, Figures 1-3B.

    b. ☒ EXPRESS MAIL # EL 544622841US dated July 14, 2000.

534 Rec'd PCT/PTO 14 JUL 2000

U.S. APPLICATION NO. (If known, see 37 C.F.R. 1.5) 09/600364	INTERNATIONAL APPLICATION NO. PCT/DE98/03696	ATTORNEY'S DOCKET NUMBER P00,1334

17. ☒ The following fees are submitted:	CALCULATIONS	PTO USE ONLY
BASIC NATIONAL FEE (37 C.F.R. 1.492(a)(1)-(5): Search Report has been prepared by the EPO or JPO . . . . . $840.00 International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) . . $670.00 No international preliminary examination fee paid to USPTO (37 C.F.R. 1.482) but international search fee paid to USPTO (37 C.F.R. 1.445(a)(2) . . . . . $760.00 Neither international preliminary examination fee (37 C.F.R. 1.482) nor international search fee (37 C.F.R. 1.445(a)(2) paid to USPTO . . . . . $970.00 International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) . . . . . $ 96.00		
ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 840.00	
Surcharge of $130.00 for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 C.F.R. 1.492(e)).	$	

Claims	Number Filed		Number Extra	Rate		
Total Claims	17	- 20 =	0	X $ 18.00	$	
Independent Claims	02	- 3 =	0	X $ 78.00	$	
Multiple Dependent Claims				$260.00 +	$	
				TOTAL OF ABOVE CALCULATIONS =	$ 840.00	
Reduction by ½ for filing by small entity, if applicable. Verified Small Entity statement must also be filed. (Note 37 C.F.R. 1.9, 1.27, 1.28)					$	
				SUBTOTAL =	$ 840.00	
Processing fee of $130.00 for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(f)). +					$	
				TOTAL NATIONAL FEE =	$ 840.00	
Fee for recording the enclosed assignment (37 C.F.R. 1.21(h). The assignment must be accompanied by an appropriate cover sheet (37 C.F.R. 3.28, 3.31). $40.00 per property +						
				TOTAL FEES ENCLOSED =	$ 840.00	
				Amount to be refunded	$	
				charged	$	

a. ☒ A check in the amount of $ 840.00 to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of $ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 08-2290. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 C.F.R. 1.494 or 1.495 has not been met, a petition to revive (37 C.F.R. 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

Hill & Simpson
A Professional Corporation
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Steven H. Noll
SIGNATURE

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NAME

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09/600364
534 Rec'd PCT/PTC 14 JUL 2000

BOX PCT
IN THE UNITED STATES DESIGNATED/ELECTED OFFICE
OF THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY--CHAPTER II

APPLICANT(S):	THOMAS ZELLERHOFF
ATTORNEY DOCKET NO.:	P00,1334
INTERNATIONAL APPLICATION NO:	PCT/DE98/03696
INTERNATIONAL FILING DATE:	16 DECEMBER 1998
INVENTION:	"METHOD OF TRANSMISSION AND TRANSMISSION SYSTEM"

Assistant Commissioner for Patents,
Washington D.C. 20231

AMENDMENT "A" PRIOR TO ACTION

Sir:

Applicants herewith amend the above-referenced PCT application, and request entry of the Amendment prior to examination on the United States Examination Phase.

IN THE SPECIFICATION:

On page 1:

cancel line 1 and substitute the following

--SPECIFICATION

TITLE

METHOD OF TRANSMISSION AND TRANSMISSION SYSTEM

BACKGROUND OF THE INVENTION

Field of the Invention-- therefor;

above line 5, insert --

Description of the Related Art--;

in line 5, cancel ", respectively,";

in lines 7-8, cancel "What is referred to as the" and substitute --The--

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therefor;

in lines 8-9, cancel “is a matter of” and substitute --deals with-- therefor;

in line 9, cancel “, respectively,”, and cancel “. The” and substitute --, in which the-- therefor;

in line 10, cancel “thereby”;

in line 11, cancel “whereby” and substitute --and-- therefor;

in line 17, after “i.e.”, insert --,--;

in line 22, cancel “What is referred to as the” and substitute --The-- therefor, and cancel “, respectively,”;

in line 23, cancel “thereto” and substitute --to the STM transmission principle-- therefor;

in line 24, cancel “or, respectively,” and substitute --/-- therefor;

in line 25, cancel “now”;

in line 26, after “with”, insert --a--; and

in line 28, cancel “What is referred to as a” and substitute --A-- therefor.

On page 2:

in line 1, cancel “, respectively”;

in lines 4-5, cancel “arrow direction” and substitute --the direction indicated by the arrow-- therefor;

cancel line 5 and substitute --) from a sender to a receiver. Each cell-- therefor;

in line 8, cancel “whereas” and substitute --and-- therefor;

in line 9, cancel “or, respectively,” and substitute --/--;

in line 10, cancel “, these being” and substitute --which are-- therefor;

in line 13, cancel “, respectively,”;

in line 16, cancel “thereby”;

in line 17, cancel “, however,”;

in line 19, cancel “The” and substitute --To address this problem, the-- therefor;

in lien 24, cancel "What is referred to as an" and substitute --An-- therefor; and

in line 29, cancel "whereby" and substitute --and-- therefor.

On amended page 3:

in line 15, cancel "whereof" and substitute --of which-- therefor;

in line 17, cancel "all";

in line 18, cancel "therein that" and substitute --in-- therefor;

in lines 20-21, cancel "can be taken from" and substitute --is disclosed in-- therefor;

in line 21, cancel ". The" and substitute --, in which-- therefor, and cancel "thereby";

in line 22, cancel "as a result whereof a not inconsiderable" and substitute --resulting in a significant-- therefor;

in line 23, cancel "arises";

in line 24, cancel "Further" and substitute --Furthermore-- therefor;

in lien 25, cancel ". How" and substitute --, which particularly addresses-- therefor;

in line 26, cancel "is thereby particularly addressed"; and

in line 28, cancel "here" and substitute --in this reference-- therefor.

On amended page 3a:

above line 1, insert --SUMMARY OF THE INVENTION--;

in line 4, cancel "whereby" and substitute --in which-- therefor;

cancel lines 8-12 and substitute --

According to the present invention, this object is achieved by a method for the transmission of data in an ATM transmission system, comprising the steps of supplying digital data of a specific plurality of data channels parallel to an input side of a sender, converting the digital data into data units that respectively comprise an identical plurality of bits from each of the data channels, serially

transmitting individual the data units in a form of cells that are respectively composed of a specific plurality of the data units, each cell having a specific, characteristic bit sequence, receiving, by a receiver the serially transmitted data units, monitoring, by the receiver, the received data units for an occurrence of the characteristic bit sequence and, after identifying the characteristic bit sequence, identifying a first data unit of a cell corresponding to the characteristic bit sequence, successively dividing, beginning with the first data unit of the cell corresponding to the characteristic bit sequence, individual bits of each the data unit of the corresponding cell onto a plurality of parallel data channels of an output side of the receiver corresponding in number to the plurality of data channels of the input side of the sender and the bits of each the data unit are output parallel via corresponding the data channels of the output side.

This object is also achieved by an ATM transmission system comprising a sender that converts digital data of a specific plurality of data channels supplied to it at an input side into data units such that each data unit comprises an identical plurality of bits from each the data channel, and serially transmits individual the data units via a transmission medium in a form of cells, each the cell comprising a specific plurality of data units, each the cell respectively comprising comprises a specific, characteristic bit sequence, a receiver that receives the serially transmitted data units from the sender and monitors the data units for an occurrence of the characteristic bit sequence, the receiver, after detecting the characteristic bit sequence in the serially transmitted data units, determines a first data unit of the cell corresponding to the characteristic bit sequence and, beginning with the first data unit, successively divides individual the bits of each the data unit of a corresponding cell onto a plurality of parallel data channels of an output side corresponding in number to the plurality of data channels of the input side and outputs the individual the bits of each the data unit in parallel.

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On page 4:

in line 1, cancel "Prior" and substitute --Related-- therefor;

in line 3, after "i.e.", insert --,--;

in line 4, cancel "whereby" and substitute --where-- therefor; and

in line 27, cancel "whereby" and substitute --by which-- therefor.

On page 5:

in line 6, after "described" insert --associated--;

in line 7, cancel "therewith";

in lines 9-10, cancel ", respectively,";

in line 10, cancel "Further" and substitute --Furthermore-- therefor;

above line 14, insert --BRIEF DESCRIPTION OF THE DRAWINGS --;

in lines 15-16, cancel "Thereby shown are:";

in line 17, after "Figure 1", insert --is--;

in line 18, after "Figure 2", insert --is a data structure diagram showing--;

in line 21, cancel "an illustration of" and substitute --is a flow diagram illustrating-- therefor;

in line 23, after "Figure 3b", insert --is--;

above line 24, insert --DESCRIPTION OF THE PREFERRED EMBODIMENTS--;

in line 26, after "3", insert --B--;

in line 27, cancel "transmission means" and substitute --sender/transmitter-- therefor; and

in line 30, cancel "reception means" and substitute --receiver-- therefor.

On page 6:

in line 3, cancel "transmission means" and substitute --sender-- therefor;

in line 5, cancel "transmission S means" and substitute --sender S-- therefor;

in line 6, cancel "reception means" and substitute --receiver-- therefor;

in line 8, after "with a" and substitute --corresponding-- therefor;

in line 9, cancel "in accord therewith--;

in line 13, cancel "transmission means' and substitute --sender-- therefor;

in line 14, cancel "transmission means' and substitute --sender-- therefor, and cancel "reception means" and substitute --receiver-- therefor;

in line 16, cancel "[sic]" and substitute --in a-- therefor;

in line 20, cancel "transmission means" and substitute --sender-- therefor, and cancel "reception means E shall be" and substitute "receiver E is-- therefor;

in line 25, cancel "or, respectively," and substitute --/-- therefor, and cancel "these being" and substitute --which are-- therefor;

in line 28, cancel "aforementioned" and substitute --previously-- therefor, and cancel "wherein" and substitute --in which-- therefor; and

in line 29, cancel "whereas" and substitute --and-- therefor.

On page 7:

in line 1, cancel "transmission means" and substitute --sender S-- therefor;

in line 2, cancel "or, respectively," and substitute --/-- therefor;

in line 9, cancel "or, respectively," and substitute --/-- therefor;

in line 10, cancel "already";

in line 21, cancel "whereby each data unit" and substitute --each of which-- therefor;

in line 25, after "i.e." insert --,--; and

in line 30, cancel "whereby," and substitute --in which-- therefor.

On page 8:

in line 2, cancel "whereby" and substitute --by which-- therefor;

in line 7, after "transmitter", insert --/sender--;

in line 8, cancel "whereby" and substitute --where-- therefor;

in line 11, after "transmitter", insert --/sender--;

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in line 13, cancel "thereby";

in line 15, cancel "So that" and substitute --In order for-- therefor, and cancel "can" and substitute --to-- therefor;

cancel line 20 and substitute --A characteristic bit sequence that is-- therefor;

in line 23, after "i.e.", insert --,--;

in line 25, cancel "it can" and substitute --the receiver can-- therefor; and

in line 27, after "i.e.", insert --,--.

On page 9:

in line 6, after "i.e.", insert --,--;

in line 7, after "i.e.", insert --,--;

in line 18, cancel "more" and substitute --most-- therefor;

in line 24, cancel "surmises" and substitute --presumes that this is-- therefor; and

in line 28, after "i.e.", insert --,--.

On page 10:

in lines 4-5, cancel "As has already been explained, the" and substitute --The-- therefor;

in line 9, cancel "thereby";

in line 24, after "octets", insert --,--; and

in line 26, after "used", insert --,--, and after "reserved", insert --,--.

On page 11:

in line 2, cancel "Further" and substitute --Furthermore-- therefor, and after "for", insert --a--;

in line 19, cancel "so that this shall" and substitute --and will-- therefor; and

in line 21, cancel "Further" and substitute --Furthermore-- therefor.

On page 12:

cancel lines 1-7, and substitute the following paragraph, therefor;

-- The above-described method is illustrative of the principles of the present invention. Numerous modifications and adaptions thereof will be readily apparent to those skilled in this art without departing from the spirit and scope of the present invention.--.

IN THE CLAIMS:

On substitute page 13:

line 1, replace "Patent claims" with --WHAT IS CLAIMED IS:--;

Please amend claims 1- 16 as follows:

1. (Amended) A method [Method] for the transmission of data in an ATM transmission system, comprising the steps of: [wherein]

supplying digital data of a specific plurality of data channels [(K_0-K_3) supplied] parallel to an [the] input side of a sender;

converting said digital data [are converted] into data units [(HB0, HB1)] that respectively comprise an identical plurality of bits from each of said data channels; [channel (K_0-K_3), and wherein the]

serially transmitting individual said data units [(HB0, HB1) are serially transmitted] in a [the] form of cells that are respectively composed of a specific plurality of said [these] data units, [(HB0, HB1), characterized in that] each cell having [comprises] a specific, characteristic bit sequence;

receiving, by a receiver said [the] serially transmitted data units [(HB0, HB1) are received];

monitoring, by said receiver, said [the] received data units [(HB0, HB1) are monitored] for an [the] occurrence of said [the] characteristic bit sequence and, after identifying said [identification of the] characteristic bit sequence, identifying a [the] first data unit [(HB0)] of a [the] cell corresponding to said [the] characteristic bit sequence [is determined];

successively dividing, beginning with said [the] first data unit [(HB0)] of

said [the] cell corresponding to said [the] characteristic bit sequence, [the] individual bits of each said data unit [(HB0, HB1)] of said [the] corresponding cell [are successively divided] onto a plurality of parallel data channels [(K_0-K_3)] of an [the] output side of said receiver corresponding in number to said [the] plurality of data channels [(K_0-K_3)] of said [the] input side of said sender and said [the] bits of each said data unit [(HB0, HB1)] are output parallel via [the] corresponding said data channels [(K_0-K_3)] of said [the] output side.

2. (Amended) A method [Method] according to claim 1, wherein said [characterized in that the] characteristic bit sequence transmitted within each cell comprises 8 bits.

3. (Amended) A method [Method] according to claim 2, further comprising the step of setting, in alternation from cell to cell, the most-significant bit of said characteristic bit sequence [characterized in that, in step b)] before said step of transmitting said [the transmission of the] characteristic bit sequence [, the more-significant bit of the characteristic bit sequene [sic] is set in alternation from cell to cell].

4. (Amended) A method [Method] according to claim 3, wherein all bits other than said most-significant bit of said [characterized in that the remaining bits of the] characteristic bit sequence are the same for each cell.

5. (Amended) A method [Method] according to claim 1, wherein said [one of the preceding claims, characterized in that the] plurality of parallel data channels [(K_0-K_3)] of said [the] input side is four, said [whereby the] digital data being [are] synchronously supplied to said [the] four data channels [(K_0-K_3)] of said [the] input side in parallel form [in step a)] in said step of supplying digital data.

6. (Amended) A method [Method] according to claim 5, wherein [characterized in that, in step a), the data of the data channels (K_0-K_3) of the input side are converted such into the data units (HB0, HB1) to be serially transmitted that] each said data unit that is transmitted in said step of serially transmitting individual said data units [(HB0, HB1)] comprises one synchronously read-in bit from each said data channel [(K_0-K_3), whereby the] said synchronously read-in bit of a specific data channel [(K_0-K_3) is] being arranged at a [the] same location in every said data unit [(HB0, HB1)].

7. (Amended) A method [Method] according to claim 5 [or 6], wherein said step of serially transmitting individual said data units comprises transmitting said [characterized in that the] characteristic bit sequence [is transmitted] in [the form of] two successive data units [(HB0, HB1)] with respectively four bits in each said successive data unit [step b)].

8. (Amended) A method [Method] according to claim 1, wherein said step of serially transmitting individual said data units transmits said [one of the preceding claims, characterized in that, in step b), the] characteristic bit sequence [is transmitted] before a first data unit of a [the] corresponding cell that comprises [the] bits of said [the] data channels [(K_0-K_3)] of said [the] input side.

9. (Amended) A method [Method] according to claim 1, wherein said step of serially transmitting said [one of the preceding claims, characterized in that the] individual data units [(HB0, HB1) are transmitted] comprises transmitting said individual data units via an optical transmission medium [in step b)].

10. (Amended) A method [Method] according to claim 1, wherein:

said step of converting said digital data into data units is performed by clocking said [one of the preceding claims, characterized in that, in step a), the] digital data of said [the] individual, parallel data channels [(K_0-K_3)] of said [the]

input side [are converted clocked into the data units (HB0, HB1)] to be serially transmitted; and

said step of successively dividing [in that, in step e), the] individual bits of every serially transmitted data unit is performed by clocking said individual bits [(HB0, HB1) are divided clocked] onto said [the] individual, parallel data channels [(K_0-K_3)] of said [the] output side and are output.

11. (Amended) A method [Method] according to claim 1, wherein [one of the preceding claims, characterized in that] each said cell, including said [the] characteristic bit sequence, comprises 64 bytes that are transmitted in 128 data units [(HB0, HB1)] with respectively four bits in said step of transmitting individual said data units [step b)].

12. (Amended) A method [Method] according to claim 1, wherein [one of the preceding claims, characterized in that] each said cell encompasses a first group of data units that comprise control information and a second group of data units that comprise payload information, said [whereby the] first group comprising said [comprises the] characteristic bit sequence for said [the] corresponding cell.

13. (Amended) A method [Method] according to claim 11, wherein said [and 12, characterized in that the] first group comprises 16 bytes and said [the] second group comprises 48 bytes.

14. (Amended) An ATM transmission system, comprising:

a sender [transmission means (S)] that converts digital data of a specific plurality of data channels [(K_0-K_3)] supplied to it at an [the] input side into data units [(HB0, HB1)] such that each data unit [(HB0)] comprises an identical plurality of bits from each said data channel [(K_0-K_3)], and serially transmits [the] individual said data units [(HB0, HB1)] via a transmission medium [(D)] in a [the] form of cells, [whereby] each said cell comprising [is composed of] a specific

plurality of data units [(HB0, HB1), characterized in that], each said cell respectively comprising comprises a specific, characteristic bit sequence;

[in that] a receiver [reception means (E) is provided] that receives said [the] serially transmitted data units [(HB0, HB1)] from said sender [the transmission means (S)] and monitors said data units [them] for an [the] occurrence of said [the] characteristic bit sequence, said receiver [whereby the reception means (E)], after detecting said [the] characteristic bit sequence in said [the] serially transmitted data units [(HB0, HB1)], determines a [the] first data unit of the cell corresponding to said [the] characteristic bit sequence and, beginning with said [this] first data unit, successively divides [the] individual said bits of each said data unit [(HB0, HB1)] of a [the] corresponding cell onto a plurality of parallel data channels [(K_0-K_3)] of an [the] output side corresponding in number to said [the] plurality of data channels [(K_0-K_3)] of said [the] input side and outputs said individual said bits of each said data unit [them] in parallel.

15. (Amended) An ATM transmission system according to claim 14, wherein said sender sends said [characterized in that the transmission means (S) and the reception means (E) are fashioned such that the] digital data of said [the] parallel data channels [(K_0-K_3)] supplied to said sender [the transmission means (S) are transmitted from the transmission means (S)], to said receiver [the reception means (E)] according to the method [according to] of claim 1 [one of the claims 2-13] and are output at said receiver [reception means (E)] via said [the] parallel data channels [(K_0-K_3)] of said [the] output side.

16. (Amended) An ATM transmission system according to claim 14, wherein said [or 15, characterized in that the] parallel data channels [(K_0-K_3)] supplied to said sender [the transmission means (S) and/or the parallel data channels (K_0-K_3) of the output side connected to the reception means (E) comprise] utilize a data transmission rate of approximately 830 Mbit/s; and

said transmission medium being an optical medium capable of

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transmitting data [in that the transmission means (S) optically transmits the individual data units (HB0, HB1) to the reception means (E)] serially with a data rate of approximately 3.3 Gbit/s.

Please add new claim 17 as follows:

17. A method according to claim 12, wherein said first group comprises 16 bytes and said second group comprises 48 bytes.

IN THE ABSTRACT

On page 17:

cancel line 2; and

cancel line 15.

REMARKS

The present Amendment revises the specification and claims to conform to United States patent practice, before examination of the present PCT application in the United States National Examination Phase. All of the changes are editorial and applicant believes no new matter is added thereby. The amendment of claims 1-16 and the addition of claim 17 is not intended to be a surrender of any of the subject matter of those claims.

Early examination on the merits is respectfully requested.

Submitted by,

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2/PRTS 09/600364
534 Rec'd PCT/PTC 14 JUL 2000

TRANSMISSION METHOD AND TRANSMISSION SYSTEM

The present invention is directed to a method for the transmission of data in an ATM transmission system as well as to an ATM transmission system, particularly an ATM broadband transmission system

Many new transmission or, respectively, switching principles for various types of transmission in communication networks have been developed during the course of the rapid development of communications technology in recent years. What is referred to as the STM transmission principle (synchronous transfer mode) is a matter of a synchronous transfer or, respectively, transmission method. The data of various data channels are thereby serially transmitted within different time slots, whereby the individual time slots are combined into frames. A frame synchronization word is transmitted for the synchronization of each and every frame, so that each time slot of a frame allocated to a specific data channel exhibits a fixed time spacing from the frame synchronization word. Each time slot can contain a relatively small number of bits, for example 8 bits, and appears at constant time intervals. However, highly different bit rates cannot be uniformly governed with the assistance of this STM principle, i.e. different communication networks for different bit rate ranges would have to be provided given application of the STM principle, particularly given the currently desired broadband signal transmission. A uniform digital broadband communication network (broadband integrated services digital network, BISDN) cannot be realized with the assistance of the STM principle.

What is referred to as the ATM transmission or, respectively, switching principle (asynchronous transfer mode) is significantly more flexible compared thereto. According to this ATM principle, cells that contain 53 octets or, respectively, bytes as payload information as a standard are now transmitted instead of the time slots of the STM principle. These ATM cells are transmitted with constant transmission rate dependent on the band width of the transmission medium. Dummy cells are used when no messages are to be transmitted. What is referred to as a "header", which contains

the control or, respectively, address information for the corresponding cell, is attached to the information field of every cell, which contains the actual payload information.

Figure 3a shows an illustration for explaining the ATM principle. As shown in Figure 3a, a plurality of cells Z are successively transmitted (in arrow direction) from a sender to a receiver. As has already been set forth, each cell thereby comprises a header with address or control information as well as an information field with the actual payload information. According to the defined standard, the information field comprises 48 octets, whereas the header comprises 5 octets, so that each cell is formed by 53 octets or, respectively, bytes. Additional (header) octets can be attached to this cell format, these being capable of being employed for the routing of the cell upon transmission of the cell from a sending subscriber to a receiving subscriber.

In newer ATM broadband transmission systems or, respectively, communication networks, the data streams between the individual transmission and reception assemblies are optically transmitted via light waveguides. These ATM broadband communication networks thereby allow an extremely high data throughput that, however, cannot -- due to technological limitations -- be processed by the switching elements that are thereby employed and that are usually fashioned in CMOS technology. The data to be transmitted are therefore supplied in parallel to transmission modules via a plurality of data lines and transmitted by the transmission modules serially multiplex via the light waveguides to reception modules, which in turn divide the serial ATM data stream onto corresponding, parallel data channels at the output side for further processing.

This principle is shown in Figure 3b. What is referred to as an optical ATM link serving as transmitter receives digital data of a plurality of data channels K_0-K_n. Further, the sender S is supplied with a clock signal T. Dependent on the clock signal T, the sender S thus respectively reads n + 1 bits in in parallel, and converts these bits into a serial, multiplexed ATM data stream D having a correspondingly higher data transmission rate, whereby this data stream D is optically transmitted to a receiver E. This receiver E parallelizes the received, serial data streams D, and in turn

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outputs it in parallel via data channel lines K_0-K_n of the output side together with a clock signal T.

It is apparent on the basis of the above description that the demultiplexing of the serial data stream D in the receiver E represents a specific problem. For demultiplexing the data stream D, the receiver E must known which bit of the serial data stream D is to be allocated to which data channel K_0-K_n of the output side. For this purpose, known solutions provide that additional synchronization information be attached to the actual serial data stream D at the transmission side, these additional synchronization information being interpreted in the receiver E and defining the allocation of the digital information transmitted in the serial data stream D to the individual data channels K_0-K_n of the output side. Thus, for example, additional synchronization information can be attached with the assistance of an encoding implemented in the sender S, particularly a block encoding. As a result of the block encoding in the sender S, a redundancy is attached to the actual serial data stream D, as a result whereof the serial data rate of the data stream D rises. On the other hand, a relatively high circuit outlay is required in the receiver E in order to be able to interpret the synchronization information attached to the serial data stream D. This all results therein that, for example, no inexpensive standard lasers can be utilized for the transmission of the data of the input-side data channels K_0-K_n.

An example for the demultiplexing of a serial data stream can be taken from United States Letters Patent 5,579,324. The arriving bit stream is thereby synchronized by a control block, as a result whereof a not inconsiderable outlay in the demultiplexing arises at the reception side.

Further, Swiss Letters Patent 682 277 discloses methods for the synchronization of a serial ATM bit stream. How the cell boundaries of a serial ATM bit stream can be identified is thereby particularly addressed. However, how a demultiplexing of a serially transmitted data stream is to be efficiently undertaken at the reception side is not addressed here.

09/600364
534 Rec'd PCT/PTO 14 JUL 2000

The present invention is therefore based on the object of creating a transmission method for an ATM transmission system as well as a corresponding ATM transmission system, whereby a receiver-side demultiplexing of the serially transmitted data stream is possible with relatively simple circuit-oriented outlay. In particular, a correct demultiplexing of the serial data stream should be possible without attaching additional synchronization information and, thus, without attaching redundancy.

According to the present invention, this object is achieved by a method having the features of claim 1 as well as by an ATM transmission system having the features of claim 14. The subclaims respectively describe advantageous and preferred exemplary embodiments of the present invention that in turn contribute to an optimally simple data transmission.

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According to the present invention and in agreement with the Prior Art, the digital data of the parallel data channels present at the transmission side continue to be converted bit-by-bit into a serial ATM data stream, i.e. continue to be multiplexed, whereby the serial data of the ATM data stream are transmitted in the form of the initially described ATM cells. According to the present invention, however, a characteristic bit sequence with whose assistance the beginning of the corresponding ATM cell in the serial data stream can be acquired at the receiver side is transmitted within each cell. This characteristic bit sequence is preferably a matter of a synchronous octet that is already transmitted with every ATM cell, so that the beginning of the corresponding ATM cell can be recognized by monitoring the received data stream for the appearance of this synchronous octet, and, thus, the information of the serial data stream can be correctly parallelized and divided onto corresponding data channels of the output side.

To this end, the digital data of the data channels supplied parallel at the input side are combined bit-by-bit into data units that form the ATM cells to be respectively transmitted. Each ATM cell transmitted with the assistance of the serial data stream thus contains a plurality of data units that respectively comprise an identical plurality of bits of each and every parallel data channel. It is fundamentally conceivable that two or more bits are transmitted with each data unit from each data channel. In practice, however, the parallel data channels adjacent at the input side are sampled bit-by-bit, so that each data unit of each data channel comprises only one bit. The corresponding bit of a data channel is always situated at the same location within each data unit, so that the individual bits can be easily divided onto the parallel, output-side data channels at the reception side after identification of the beginning of a data unit. The employment of respectively four data channels of the input side and output side is especially advantageous since the data of the data channels can be combined into half-bytes in four-bit fashion, whereby each half-byte forms an above-described data unit of the ATM cell to be transmitted. Each octet of an ATM cell, accordingly, comprises two of these half-bytes. The data of each ATM cell are thus serially transmitted from the transmitter to the receiver in half-byte fashion.

The inventively proposed evaluation of the characteristic bit sequence of the cell, which is already transmitted with the cell and is usually formed by the first byte of each ATM cell, thus makes it possible that no additional signals or synchronization information for the channel allocation are required for the demultiplexing of the receiver side. An increase in the data rate of the optically transmitted, serial data stream together with the above-described disadvantages connected therewith can thus be avoided. The invention thus enables a data transmission according to the ATM transmission principle with relatively little circuit outlay and allows the employment of smaller module sizes for the transmitter or, respectively, receiver modules. Further, the transmission is possible with a lower dissipated power, and the costs can be reduced as a result of the lower circuit outlay.

The invention is particularly directed to the transmission of data within an ATM switching system.

The invention is explained in greater detail below with reference to the attached drawing on the basis of a preferred exemplary embodiment. Thereby shown are:

Figure 1 a schematic illustration of a preferred exemplary embodiment of the inventive ATM broadband transmission system;

Figure 2 the internal structure of an ATM cell that is transmitted from a sender to a receiver via the serial data flow shown in Figure 1;

Figure 3a an illustration of the basic data flow according to the ATM transmission principle; and

Figure 3b a schematic illustration of a known ATM broadband transmission system.

Figure 1 schematically shows the structure of a preferred exemplary embodiment of the inventive ATM transmission system. Viewed from the outside, this structure essentially corresponds to the known structure shown in Figure 3. A transmission means S receives a plurality of data channels K_0-K_3 as well as a clock signal T and converts the digital data of these data channels pending at it in parallel into a serial data stream D that is composed of a plurality of successively transmitted ATM cells. This serial data stream D is received by a reception means E and

interpreted and allocated at the output side to the data channels K_0-K_3 of the output side. A special characteristic of the exemplary embodiment shown in Figure 1, however, is the fact that the transmission means S is supplied with four data channels K_0-K_3 whose digital data are acquired parallel in four-bit fashion and converted into the serial data stream, i.e. multiplexed. The transmission S means optically transmits the serial data stream to the reception means E via a light waveguide arrangement. The individual data channels K_0-K_3 can, for example, exhibit a transmission rate of 830 Mbit/s, whereas the serial ATM data stream is optically transmitted with a data rate of 3.3 Gbit/s in accord therewith.

The parallel read-in of the digital data of the four data channels K_0-K_3 in four-bit fashion is particularly advantageous -- as shall be explained in greater detail later -- because the four bits of the individual data channels K_0-K_3 read-in in parallel can be combined especially easily in the transmission means S to form data units in the form of half-bytes that are transmitted from the transmission means S to the reception means E in the form of ATM cells. According to the exemplary embodiment shown in Figure 1, each ATM cell of the series [sic] data stream D to be transmitted accordingly comprises a plurality of serially transmitted half-bytes that each respectively comprise a bit read-in in parallel from each data channel K_0-K_3.

The structure of the ATM cells of the serial data stream D transmitted from the transmission means S to the reception means E shall be explained in greater detail below with reference to Figure 2. This is thereby a matter of a preferred example of a cell format employed by the assignee for a multicast mode. Of course, other ATM cell formats are also possible.

The ATM cell shown in Figure 2 comprises the standardized ATM cell structure as initially already set forth with 53 octets or, respectively, bytes, these being formed by the octets Nos. 10-62 in Figure 2. This standardized cell structure is referenced "external ATM cell" in Figure 2 and comprises, first, an "external" header as well as the aforementioned information field wherein the actual payload information is contained. The "external" header comprises 5 octets, whereas the information field comprises 48 octets.

According to Figure 2, the transmission means shown in Figure 1 attaches additional address or, respectively, control octets that comprise internal routing information for the transmission of the ATM cells between the individual switching modules to this standardized ATM cell structure having 5 header octets and 48 information field octets. According to Figure 2, these internal address or, respectively, control information comprises an "internal" header with an additional 10 octets as well as an "internal" trailer with one octet that terminates the ATM cell, so that the ATM cells to be transmitted overall from the transmitter S to the receiver E comprise a total of 64 octets or, respectively, bytes. As has already been explained on the basis of Figure 3, it is already fundamentally known to attach additional address or control octets with routing information for the transmission to the 53 octets prescribed according to the standard.

Inventively, however, it is now proposed that a characteristic bit sequence that can be unambiguously identified within each ATM cell at the reception side be transmitted within the ATM cell. The receiver monitors the serial data stream provided to it for the occurrence of this characteristic bit sequence and, after recognizing this characteristic bit sequence, can identify and determine the start of the corresponding ATM cell within the serially transmitted data stream. This is particularly possible according to the present invention because the bits of the digital data channels K_0-K_3 read-in in parallel at the transmission side (see Figure 1) are combined into data units, whereby each data unit comprises an identical plurality of bits from each data channel. The bits of each data channel always have the same position within the individual data units, so that -- after identifying the characteristic bit sequence in the receiver -- the beginning of the first data unit of the corresponding ATM cell, i.e. the position of the individual data units in the serial optical data stream, can be determined, and the individual bits of the individual data units can be correctly divided onto the individual data channels K_0-K_3 at the output side.

It would be fundamentally possible that the individual, serially transmitted data units of each ATM cell comprise two or more bits from each data channel K_0-K_3, whereby, for example, the bits 0 and 1 are allocated to the data channel K_0, the bits 2

and 3 are allocated to the data channel K_1, etc. In this case, the data units to be transmitted would be respectively formed by a full byte, whereby each ATM cell would be correspondingly transmitted byte-by-byte from the transmitter to the receiver.

However, it is advantageous to respectively read only one bit in in parallel from each data channel K_0-K_3 at the transmission side dependent on the supplied clock signal T (see Figure 1) and to multiplex them, so that the data units of the serial data stream transmitted from the transmitter S shown in Figure 1 to the receiver E are respectively formed by half-bytes with four bits, whereby 128 serially transmitted half-bytes form an ATM cell of the serial data stream D according to Figure 2. In other words, this means that each octet of the ATM cell shown in Figure 2 is preferably transmitted from the transmitter S to the receiver E in half-bytes by transmission of a half-byte HB0 and of a following, second half-byte HB1. The arrow shown in Figure 2 thereby corresponds to the transmission sequence of the individual half-bytes HB0 and HB1.

So that the bits contained in the individual half-bytes can be correctly acquired at the receiver side and divided onto the data channels K_0-K_3 of the output side, the receiver E must determine, first, the respective beginning of the individual ATM cells and, second, the beginning of every half-byte within each ATM cell in the data stream D having successively transmitted half-bytes that is supplied to it.

As has already been explained, a characteristic bit sequence that is monitored for occurrence at the receiver side is transmitted within each ATM cell for this purpose. This characteristic bit sequence is always transmitted at the same location in each of the transmitted ATM cells, i.e. in the same octet and divided onto the same half-bytes. When, thus, the receiver recognizes the occurrence of this characteristic bit sequence in the serial data stream D supplied to it, it can -- since it knows the relationship between the position of the characteristic bit sequence within the ATM cell and the beginning of the ATM cell, i.e. the position of the ATM cell within the serial data stream -- determine the beginning of the corresponding ATM cells and, thus, the first half-byte of this ATM cell in the serial data stream and can correctly divide the individual bits of this first half-byte as well as of the following half-

bytes of the corresponding ATM cell successively onto the individual data channels K_0-K_3 of the output side, so that these are output correspondingly parallel.

Due to the fact that a bit sequence that is already contained and transmitted in the ATM cell format shown in Figure 2 is employed as characteristic bit sequence of each ATM cell, no additional data outlay arises for the receive-side synchronization, i.e. allocation of the individual bits of the serial data stream to the corresponding data channels K_0-K_3 of the output side, i.e. no additional synchronization information need be attached to the actual serial data stream D to be transmitted, so that no redundancy occurs.

Advantageously, the first octet of each and every ATM cell can be employed as the above-described, characteristic bit sequence. Given employment of the cell format shown in Figure 2, this octet 0 shown in Figure 2 is required in standardized fashion in the ATM broadband transmission systems shown in Figures 1 and 3 for the interpretation and determination of the corresponding ATM cell in the individual switching modules (transmitter, receiver) and is referred to a synchronous octet. This synchronous octet comprises bits consecutively numbered with 0 through 6 in Figure 2 that have the same value for each ATM cell to be transmitted and are thus fixed. The more significant bit 7 of this synchronous octet, which is referenced T in Figure 2, is a toggle bit that the transmitter sets in alternation from ATM cell to ATM cell. Advantageously, this synchronous octet already transmitted with the ATM cell format shown in Figure 2 is employed as characteristic bit sequence whose occurrence in the serial data stream is monitored by the receiver. As soon as the receiver E shown in Figure 1 has recognized the occurrence of this bit sequence of the synchronous octet in the serial data stream D, it surmises the beginning of a new ATM cell that comprises 64 octets overall, including the synchronous octet, so that the receiver E can interpret the individual octets of the corresponding ATM cell transmitted by half-bytes. As shown in Figure 2, of course, the synchronous octet is also transmitted by half-bytes according to the preferred exemplary embodiment, i.e. the four less significant bits 0-3 of the synchronous octet are serially transmitted within

a first half-byte HB0 and the four more significant bits 4-7 are serially transmitted in a following half-byte HB1.

The relationship of the bits combined in the half-bytes HB0 or, respectively, HB1 and the corresponding data channels is also shown in Figure 2. As has already been explained, the individual octets 0-63 of every ATM cell are transmitted from the transmitter to the receiver by half-bytes on the basis of the successive transmission of a first half-byte HB0 and of a second half-byte HB1. Each of these half-bytes HB0, HB1 comprises four bits read in in parallel from the data channels K_0-K_3 adjacent at the transmitter S (see Figure 1). A bit position is thereby allocated to a fixed data channel within each half-byte HB0, HB1. According to Figure 2, for example, the bit 0 of each half-byte HB0 or HB1 thus always corresponds to the data channel K_0, whereas, for example, the bit 2 corresponds to the data channel K_2. The receiver E can thus simply demultiplex the serial bit sequence supplied to it, since, after recognizing the occurrence of the synchronous octet in the serial data stream, it knows the beginning of the first half-byte of the corresponding ATM cell, so that -- according to the allocation shown in Figure 2 -- it must simply successively distribute respectively one bit onto the data channels K_0-K_3 of the output side so that the parallel data channels adjacent at the input side again appear correctly at the output of the receiver.

The function of the individual component parts of the ATM cell format shown in Figure 2 shall be briefly explained below by way of addition.

As has already been explained, the "internal" header attached to the standardized ("external") ATM cell format having a total of 53 octets comprises a total of 10 octets 0-9. The individual octets of this "internal' header comprise routing information for the transmission of the corresponding ATM cells. Some bits R that are currently not yet used and are thus reserved are present within this internal header. The bits referenced SSN (switching state number) serve the purpose of designationally transmitting the corresponding ATM cell to a specific switching element. For example, a specific switching element can thus recognize on the basis of the information of this SSN bit field whether the respective ATM cell is intended for the

corresponding switching element. The bits referenced CF define the currently still unused flag (congestion flag). Further, the internal header contains a parity bit P for parity check of the routing information contained in the internal header. AUX references auxiliary bits. The bits MCRA reference the internal routing address of the corresponding ATM cell (multicast routing address). The bits HK (housekeeping) serve for the classification of the cell (dummy cell, etc.). The bits ADI (address identifier) serve for defining addresses for a physical multicast mode in the individual switching elements. Delay priorities can be defined for the individual ATM cells with the assistance of the bits CDP (cell delay priority). The octets of the internal header referenced SN (sequence number) serve for consecutive numbering of the individual, serially transmitted ATM cells. The bits referenced RMS (redundant module sender) and RMR (redundant module receiver) are special bits for a farther-reaching redundancy classification of the individual ATM cells. This is especially meaningful because all ATM cells are fundamentally transmitted twice for security reasons.

The internal trailer that is likewise attached to the standardized cell format (octet 10-62) at the end comprises a checkbit sequence referenced FCS2 (frame check sequence) for the payload information transmitted in the information field.

The structure of the "external" header with the standardized 5 octets 10-14 is notoriously known, so that this shall not be discussed further here. In general, this external header contains address information MCI (multicast connection identifier) and VCI (virtual channel identifier). Further, the type of payload transmitted in the information field is referenced PTI (payload type identification) and the corresponding ATM cell has a specific cell priority (CLP, cell loss priority) allocated to it. Finally, the external header contains a further check octet (FCS1, frame check sequence) that serves for checking both the external header (octet 10-14) as well as the octets 2-9 of the internal header.

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List of Reference Characters

	S	transmission means
	E	reception means
	D	serial data stream
5	K_0-K_3	parallel data channels
	T-	clock signal
	Z	ATM cell

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Patent Claims

1. Method for the transmission of data in an ATM transmission system, wherein

digital data of a specific plurality of data channels (K_0-K_3) supplied parallel to the input side are converted into data units (HB0, HB1) that respectively comprise an identical plurality of bits from each data channel (K_0-K_3), and wherein the individual data units (HB0, HB1) are serially transmitted in the form of cells that are respectively composed of a specific plurality of these data units (HB0, HB1), characterized in that each cell comprises a specific, characteristic bit sequence;

the serially transmitted data units (HB0, HB1) are received;

the received data units (HB0, HB1) are monitored for the occurrence of the characteristic bit sequence and, after identification of the characteristic bit sequence, the first data unit (HB0) of the cell corresponding to the characteristic bit sequence is determined;

beginning with the first data unit (HB0) of the cell corresponding to the characteristic bit sequence, the individual bits of each data unit (HB0, HB1) of the corresponding cell are successively divided onto a plurality of parallel data channels (K_0-K_3) of the output side corresponding in number to the plurality of data channels (K_0-K_3) of the input side and the bits of each data unit (HB0, HB1) are output parallel via the corresponding data channels (K_0-K_3) of the output side.

2. Method according to claim 1, characterized in that the characteristic bit sequence transmitted within each cell comprises 8 bits.

3. Method according to claim 2, characterized in that, in step b) before the transmission of the characteristic bit sequence, the more-significant bit of the characteristic bit sequene [sic] is set in alternation from cell to cell.

4. Method according to claim 3, characterized in that the remaining bits of the characteristic bit sequence are the same for each cell.

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5. Method according to one of the preceding claims, characterized in that the plurality of parallel data channels (K_0-K_3) of the input side is four, whereby the digital data are synchronously supplied to the four data channels (K_0-K_3) of the input side in parallel form in step a).

6. Method according to claim 5, characterized in that, in step a), the data of the data channels (K_0-K_3) of the input side are converted such into the data units (HB0, HB1) to be serially transmitted that each data unit (HB0, HB1) comprises one synchronously read-in bit from each data channel (K_0-K_3), whereby the bit of a specific data channel (K_0-K_3) is arranged at the same location in every data unit (HB0, HB1).

7. Method according to claim 5 or 6, characterized in that the characteristic bit sequence is transmitted in the form of two successive data units (HB0, HB1) with respectively four bits in step b).

8. Method according to one of the preceding claims, characterized in that, in step b), the characteristic bit sequence is transmitted before a first data unit of the corresponding cell that comprises the bits of the data channels (K_0-K_3) of the input side.

9. Method according to one of the preceding claims, characterized in that the individual data units (HB0, HB1) are transmitted via an optical transmission medium in step b).

10. Method according to one of the preceding claims, characterized in that, in step a), the digital data of the individual, parallel data channels (K_0-K_3) of the input side are converted clocked into the data units (HB0, HB1) to be serially transmitted; and in that, in step e), the individual bits of every serially transmitted data unit (HB0, HB1) are divided clocked onto the individual, parallel data channels (K_0-K_3) of the output side and are output.

11. Method according to one of the preceding claims, characterized in that each cell, including the characteristic bit sequence, comprises 64 bytes that are transmitted in 128 data units (HB0, HB1) with respectively four bits in step b).

12. Method according to one of the preceding claims, characterized in that each cell encompasses a first group of data units that comprise control information and a second group of data units that comprise payload information, whereby the first group comprises the characteristic bit sequence for the corresponding cell.

13. Method according to claim 11 and 12, characterized in that the first group comprises 16 bytes and the second group comprises 48 bytes.

14. ATM transmission system,

comprising a transmission means (S) that converts digital data of a specific plurality of data channels (K_0-K_3) supplied to it at the input side into data units (HB0, HB1) such that each data unit (HB0) comprises an identical plurality of bits from each data channel (K_0-K_3), and serially transmits the individual data units (HB0, HB1) via a transmission medium (D) in the form of cells, whereby each cell is composed of a specific plurality of data units (HB0, HB1),

characterized in that each cell respectively comprises a specific, characteristic bit sequence;

in that a reception means (E) is provided that receives the serially transmitted data units (HB0, HB1) from the transmission means (S) and monitors them for the occurrence of the characteristic bit sequence, whereby the reception means (E), after detecting the characteristic bit sequence in the serially transmitted data units (HB0, HB1), determines the first data unit of the cell corresponding to the characteristic bit sequence and, beginning with this first data unit, successively divides the individual bits of each data unit (HB0, HB1) of the corresponding cell onto a plurality of parallel data channels (K_0-K_3) of the output side corresponding in number to the plurality of data channels (K_0-K_3) of the input side and outputs them in parallel.

15. ATM transmission system according to claim 14, characterized in that the transmission means (S) and the reception means (E) are fashioned such that the digital data of the parallel data channels (K_0-K_3) supplied to the transmission means (S) are transmitted from the transmission means (S) to the reception means (E) according to the method according to one of the claims 2-13 and are output at said reception means (E) via the parallel data channels (K_0-K_3) of the output side.

16. ATM transmission system according to claim 14 or 15, characterized in that the parallel data channels (K_0-K_3) supplied to the transmission means (S) and/or the parallel data channels (K_0-K_3) of the output side connected to the reception means (E) comprise a data transmission rate of approximately 830 Mbit/s; and in that the transmission means (S) optically transmits the individual data units (HB0, HB1) to the reception means (E) serially with a data rate of approximately 3.3 Gbit/s.

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Abstract

Transmission Method and Transmission System

Digital data of a specific plurality of data channels (K_0-K_n) of the input side supplied in parallel form are converted into a serial data stream (D) and are in turn divided into parallel data channels (K_0-K_n) of the output side upon reception with the assistance of a corresponding demultiplexing. In order to enable the allocation of the bits of the data channels (K_0-K_n) of the input side read-in in parallel without great circuit-oriented outlay and without additional synchronization information, it is proposed to monitor the serial data stream (D) transmitted in the form of ATM cells for the occurrence of a specific bit sequence that is already transmitted with every cell format. The position of the individual bits of the corresponding data channels (K_0-K_n) in the serial, optical data stream can be determined on the basis of this characteristic bit sequence, so that a correct parallelization of the data stream (D) at the output side is possible.

Figure 1

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534 Rec'd PCT/PTO 14 JUL 2000

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UNDER THE PATENT COOPERATION TREATY--CHAPTER II

APPLICANT(S):	THOMAS ZELLERHOFF
ATTORNEY DOCKET NO.:	P00,1334
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INTERNATIONAL FILING DATE:	16 DECEMBER 1998
INVENTION:	"METHOD OF TRANSMISSION AND TRANSMISSION SYSTEM"

Assistant Commissioner for Patents,
Washington D.C. 20231

SUBMISSION OF INFORMAL DRAWINGS

Sir:

Applicant herewith submits two sheets (Figures 1-3B) of informal drawings for the above-referenced PCT application.

Submitted by,

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FIG 1

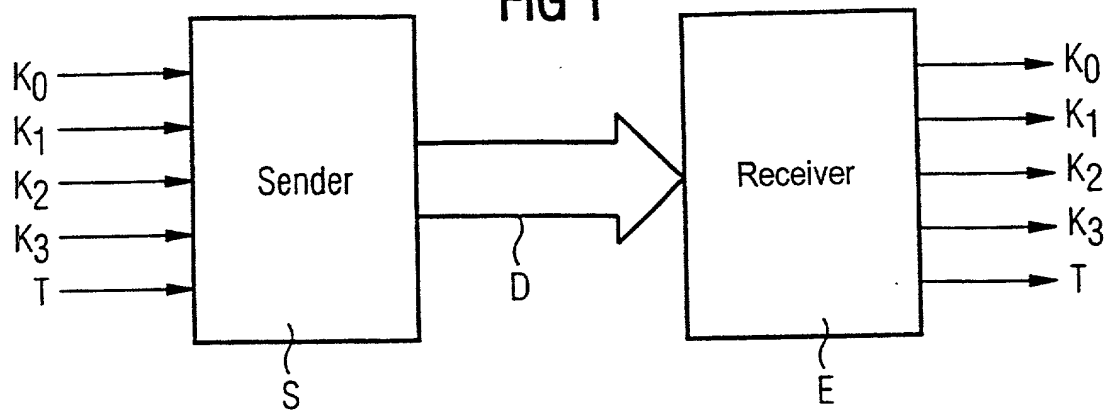

FIG 3 A
(Prior Art)

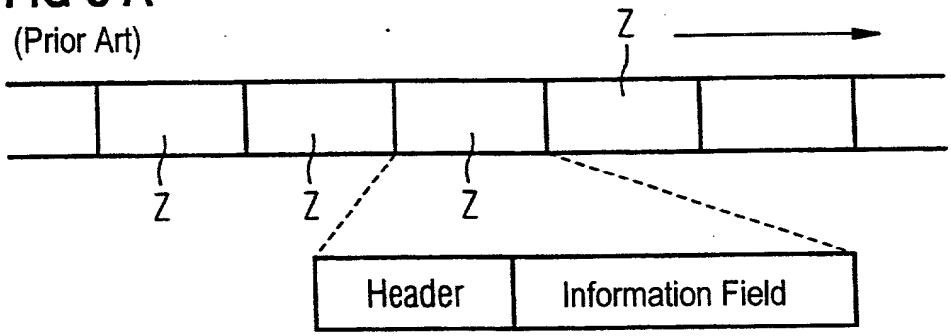

FIG 3 B
(Prior Art)

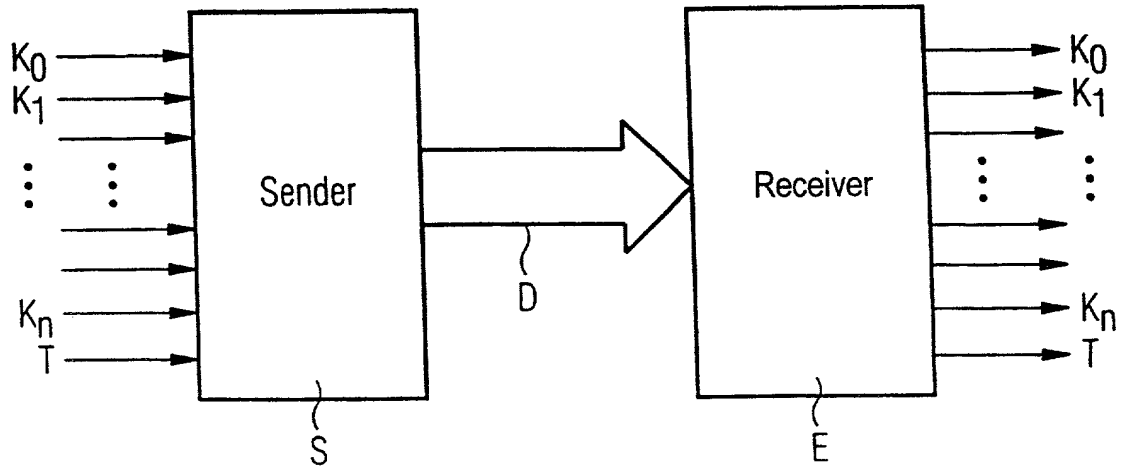

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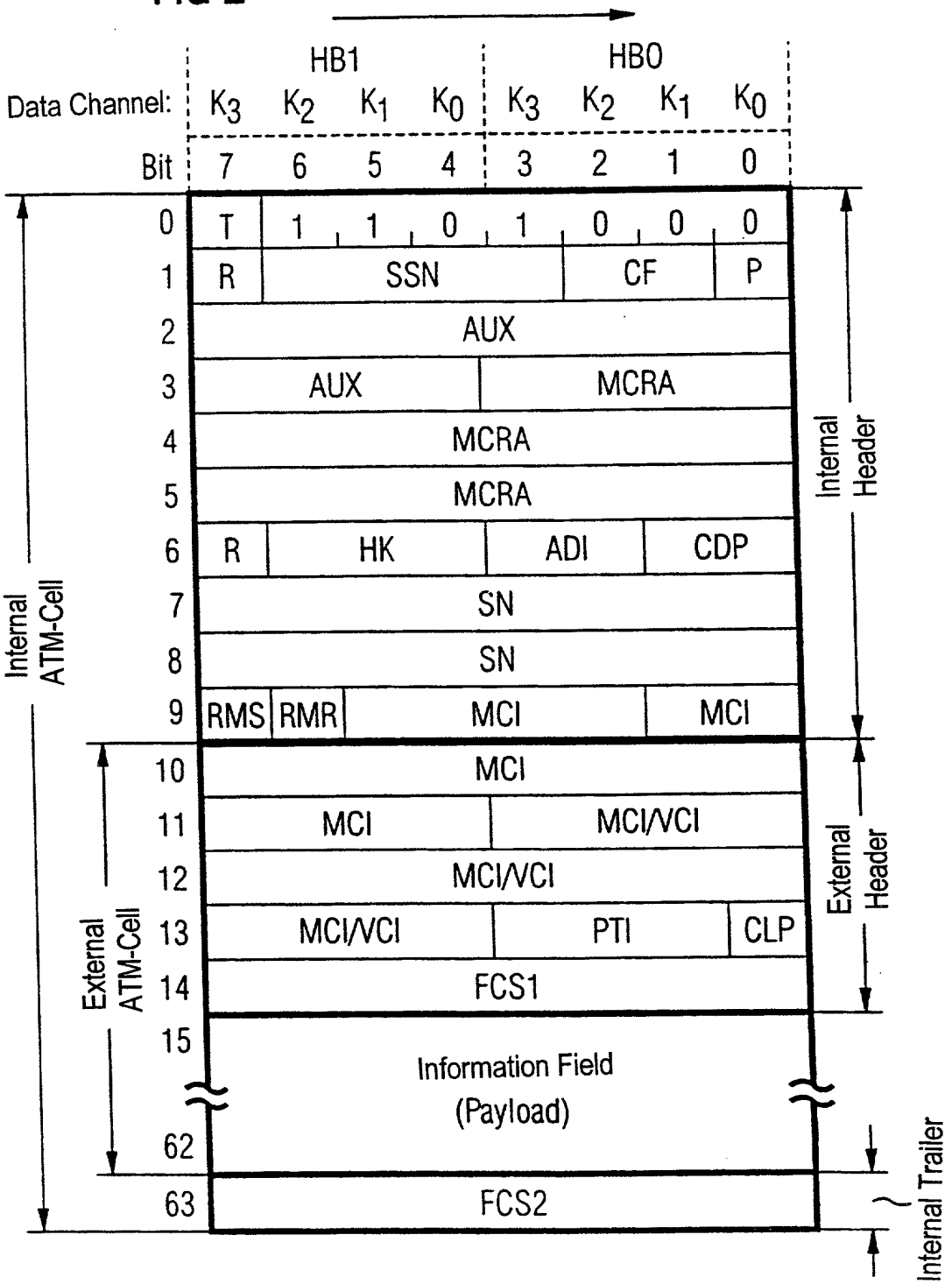
FIG 2


HB1
HB0
Data Channel: K3 K2 K1 K0 K3 K2 K1 K0
Bit 7 6 5 4 3 2 1 0
0 T 1 1 0 1 0 0 0
1 R SSN CF P
2 AUX
3 AUX MCRA
4 MCRA
5 MCRA
6 R HK ADI CDP
7 SN
8 SN
9 RMS RMR MCI MCI
10 MCI
11 MCI MCI/VCI
12 MCI/VCI
13 MCI/VCI PTI CLP
14 FCS1
15
Information Field
(Payload)
62
63 FCS2
Internal ATM-Cell
External ATM-Cell
Internal Header
External Header
Internal Trailer

German Language Declaration

Prior foreign appplications
Priorität beansprucht

			Priority Claimed	
198 02 365.0	Germany	22. Januar 1998	☒	☐
(Number) (Nummer)	(Country) (Land)	(Day Month Year Filed) (Tag Monat Jahr eingereicht)	Yes Ja	No Nein
			☐	☐
(Number) (Nummer)	(Country) (Land)	(Day Month Year Filed) (Tag Monat Jahr eingereicht)	Yes Ja	No Nein
			☐	☐
(Number) (Nummer)	(Country) (Land)	(Day Month Year Filed) (Tag Monat Jahr eingereicht)	Yes Ja	No Nein

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozeßordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35. United States Code. §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occured between the filing date of the prior application and the national or PCT international filing date of this application.

(Application Serial No.) (Anmeldeseriennummer)	(Filing Date) (Anmeldedatum)	(Status) (patentiert, anhängig, aufgegeben)	(Status) (patented, pending, abandoned)
(Application Serial No.) (Anmeldeseriennummer)	(Filing Date) (Anmeldedatum)	(Status) (patentiert, anhängig, aufgeben)	(Status) (patented, pending, abandoned)

Ich erkläre hiermit, dass alle von mir in der vorliegenden Erklärung gemachten Angaben nach meinem besten Wissen und Gewissen der vollen Wahrheit entsprechen, und dass ich diese eidesstattliche Erklärung in Kenntnis dessen abgebe, dass wissentlich und vorsätzlich falsche Angaben gemäss Paragraph 1001, Absatz 18 der Zivilprozessordnung der Vereinigten Staaten von Amerika mit Geldstrafe belegt und/oder Gefängnis bestraft werden koennen, und dass derartig wissentlich und vorsätzlich falsche Angaben die Gültigkeit der vorliegenden Patentanmeldung oder eines darauf erteilten Patentes gefährden können.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Declaration and Power of Attorney For Patent Application
Erklärung Für Patentanmeldungen Mit Vollmacht
German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

dass mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

dass ich, nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

Übertragungsverfahren und Übertragungssystem

deren Beschreibung

(zutreffendes ankreuzen)

☒ hier beigefügt ist.

☐ am _____ als PCT internationale Anmeldung PCT Anmeldungsnummer _____ eingereicht wurde und am _____ abgeändert wurde (falls tatsächlich abgeändert).

Ich bestätige hiermit, dass ich den Inhalt der obigen Patentanmeldung einschliesslich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) von Wichtigkeit sind, an.

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Abschnitt 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119 aller unten angegebenen Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde, und habe auch alle Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde nachstehend gekennzeichnet, die ein Anmeldedatum haben, das vor dem Anmeldedatum der Anmeldung liegt, für die Priorität beansprucht wird.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

_____

_____

the specification of which

(check one)

☐ is attached hereto.

☐ was filed on _____ as PCT international application PCT Application No. _____ and was amended on _____ (if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Form PTO-FB-240 (8-83)
Patent and Trademark Office-U.S. DEPARTMENT OF COMMERCE

Docket No. 1060

German Language Declaration

VERTRETUNGSVOLLMACHT: Als benannter Erfinder beauftrage ich hiermit den nachstehend benannten Patentanwalt (oder die nachstehend benannten Patentanwälte) und/oder Patent-Agenten mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Geschäfte vor dem Patent- und Warenzeichenamt: *(Name und Registrationsnummer anführen)*

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

And I hereby appoint

Messrs. John D. Simpson (Registration No. 19,842) Lewis T. Steadman (17,074), William C. Stueber (16,453), P. Phillips Connor (19,259), Dennis A. Gross (24,410), Marvin Moody (16,549), Steven H. Noll (28,982), Brett A. Valiquet (27,841), Thomas I. Ross (29,275), Kevin W. Guynn (29,927), Edward A. Lehmann (22,312), James D. Hobart (24,149), Robert M. Barrett (30,142), James Van Santen (16,584), J. Arthur Gross (13,615), Richard J. Schwarz (13,472) and Melvin A. Robinson (31,870), David R. Metzger (32,919), John R. Garrett (27,888) all members of the firm of Hill, Steadman & Simpson, A Professional Corporation.

18

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Voller Name des zweiten Miterfinders (falls zutreffend):	Full name of second joint inventor, if any:
Unterschrift des Erfinders Datum	Second Inventor's signature Date
Wohnsitz	Residence
Staatsangehörigkeit	Citizenship
Postanschrift	Post Office Address

(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben).

(Supply similar information and signature for third and subsequent joint inventors).